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Disordered Eating and Exercise Behaviors During University Transition

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Psychology and Neuroscience Departmental Honors Thesis

University of Colorado Boulder

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Abstract

Disordered eating and exercise behaviors are far from uncommon on university campuses, and those attending university are at an increased risk of developing eating disorders. Many risk factors have been established in clinical populations, but have only been studied in few subclinical populations. The present research examined (a) gender differences on disordered eating and exercise, as well as on risk factors for these outcomes; and (b) the main and moderated associations between risk factors and disordered eating and exercise during the transition to university. Risk factors examined in the study include expressed emotion, perceived family criticism, family functioning, peer comparison, and perceived stress. Compared to men, women reported higher mean scores in disordered eating, peer comparison, and perceived stress. Results also suggest that disordered exercise behaviors, peer comparisons, and perceived stress were significantly and positively associated with disordered eating behaviors. There were no significant interactions between risk factors and either disordered eating or exercise. The present findings lend support to the perspective that peer comparisons are important correlates of disordered eating and exercise behaviors, and also suggest that family risk factors are not significantly associated with disordered eating and exercise.

Keywords: eating disorder, exercise, risk factors, college students, university transition

Eating disorders (EDs) are characterized by an unhealthy relationship with food or eating in the form of restricting, purging, bingeing or compensatory behaviors, the full extent of which are often concealed from family and peers. EDs are highly morbid disorders and the prevalence of EDs increased by 58% between 1999 and 2006; during the same period of time, the prevalence in adolescents, aged 12 to 19, and young adults, aged 19 to 30, increased by 18% and 19% respectively (White, Reynolds-Malear, & Cordero, 2011; Zhao & Encinosa, 2009). The overall prevalence of EDs with the new DSM-V criteria among women is 4% for anorexia nervosa (AN), 2% for bulimia nervosa (BN), and 2% for binge eating disorder (BED); the standardized mortality rate (SMR) per 1000 people is 5.9 for AN, 1.9 for BN, and 2.3 for BED (Smink, van Hoeken, & Hoek, 2013).

Some researchers have adopted a developmental perspective in studying EDs, focusing on the prevalence and risk factors for ED during high-risk developmental periods. One such period is the transition to university. Not only is the freshman year of university the first year of independence from parents and a separation from established support networks, but it is also a time characterized by added pressure to succeed not only academically, but socially as well; combined, these factors can account for the increased prevalence of AN, BN, and BED among college attending individuals compared to their non-attending peers (Hunt & Eisenberg, 2010). Initial studies tracking disordered eating during the transition to university found no difference in the frequency of dieting or disordered eating behaviors during the transition to university settings among women than had been noted prior to attending university (Vohs, Heatherton & Herrin, 2001). More recent studies, however, show an increase in disordered eating behaviors for people attending university than their non-attending peers (Delinsky & Wilson 2008), but not an increase in ED diagnoses, despite evidence for worsening of symptoms (Cooley & Toray, 2001).

Although many studies find a higher percentage of university students than community samples and their non-attending peers meet clinical criteria for EDs, relatively few students with EDs present for treatment or take advantage of campus support (Hudson, Hiripi, Pope & Kessler, 2007). Those who do seek treatment often receive treatment for a comorbid disorder (e.g., major depression, suicidal behaviors, or generalized anxiety disorder), or after an ED-related hospitalization, as EDs remain among the top causes of disability among adolescent girls and young women, with AN having the highest mortality rate of any mental health disorder with the most common cause of death being suicide (Hoek & van Hoeken, 2003; Hunt & Eisenberg, 2010; Smink, van Hoeken, & Hoek, 2013; Streigel-Moore & Bulik, 2007). EDs and associated disordered exercise behaviors are also very resistant to even empirically supported treatments and patients are prone to relapse during stressful life events (Fairburn & Harrison, 2003).

The present study was conducted to examine the associations between expressed emotion, perceived family criticism, peer comparison, and perceived stress and disordered eating and exercise in a sample of college students in their first semester of college. In the sections that follow, the prevalence of disordered eating and exercise in college students and risk factors for disordered eating and exercise are reviewed.

University Students

EDs were initially conceptualized as being established almost exclusively in adolescence for females (Streigel-Moore & Bulik, 2007). Although this conceptualization remains the case for restrictive disorders like AN and purging disorders like BN, BED and atypical, or eating disorder not otherwise specified (EDNOS), have been shown to have later onset, with the onset of BED occurring most frequently in the 40s. However, even research into the prevalence of

BED has shown early onset in college is not uncommon (Fairburn & Harrison, 2003; Freeman & Gil, 2004; Sulkowski, Dempsey, & Dempsey, 2011).

The top six most psychologically distressing concerns college students face are depression, generalized and social anxiety, academic distress, family distress, and eating concerns (Center for Collegiate Mental Health, 2016). EDs are either comorbid with or highly correlated with each of the other five concerns. The median age of disordered eating behavior origination was observed to be 18-21, indicating a later age of onset than previously observed in exclusively clinical populations because of lower motivation to seek help and corroborating research indicating high prevalence at the university level (Eisenberg, Nicklett, Roeder & Kirz, 2011; Hudson et al., 2007). Although much research has focused on college-aged individuals, participants are usually females with a diagnosis of an ED or athletes (Smolak, Murnen & Ruble, 1999; Sundgot-Borgen & Torstveit, 2004). Nonclinical, or subclinical, samples also have a significant prevalence of EDs and remain untreated, especially at the university level (Eisenberg et al., 2011).

The American College Health Association's (2015) assessment reported that an average of 1.3% of university students indicate an eating disorder or problem had a significant impact on their academic performance, and 25.5% (17.1% of males and 29.4% of females) reported their personal appearance had been traumatic or very difficult to handle over the previous 12 months. The impact of EDs on academic performance is comparable to the impact on academic disruption of other highly publicized and controversial issues on university campuses, such as sexual assault (1.1%), discrimination (1.3%), and drug use (1.6%). The same report found 1.3% (0.6% of males, 1.5% of females) received a diagnosis of AN, 1.1% a diagnosis of BN (0.6% of males, 1.3% of females) in the past year.

Gender Differences

Apart from the studies of adolescent girls, the population most at risk for developing EDs are those involved in professions or activities with a focus on physical fitness and perfectionism, including athletes in aesthetically-oriented or weight-restrictive sports such as gymnastics, dancing, and wrestling (Ackard, Brehm & Steffen, 2010; Polivy & Herman, 2002; Schreyer et al., 2015; Stice, 2002). Research has shown the initial conceptualization of EDs predominantly affecting females, either in adolescence or as athletes, is increasingly inaccurate with more males presenting with disordered eating and exercise behaviors and meeting criteria for an ED diagnosis (Yager & O'Dea, 2010; Woodside et al., 2001). The lifetime prevalence estimates of EDs have increased over the past 15 years, especially among men who were seldom included in the early studies on prevalence (Hoek & van Hoeken, 2003; Hsu, Kaye, & Weltzin, 1993). A recent report on the prevalence of AN, BN, and BED estimated the prevalence of ED to be 5.9% in women (AN=.9%; BN=1.5%; BED=3.5%) and 2.8% in men (AN=.3%; BN=.5%; BED=2.0%); additionally, 2.5% of women and 1.7% of men reported any binge eating and .4% of women and .8% of men qualified as meeting subthreshold BED (Hudson, Hiripi, Pope & Kessler, 2012).

Risk factors for Disordered Eating

Despite numerous studies into underlying psychological, social, and biological processes and risk factors for EDs, identifying disorder-specific risk factors continues to be an obstacle, in part because EDs overlap in their symptoms more than they differ and they frequently co-occur with anxiety, mood, and substance abuse disorders (Hudson et al., 2007; McVey, Pepler, Davis, Flett & Abdolell, 2002). The primary, and most promising, psychosocial risk factors that have been investigated include unrealistic body images and expectations portrayed in the media, body

dissatisfaction, family functioning, intergenerational transmission, and peer influences (Baker, Whisman & Brownell, 2000; Field et al., 2001; Hudson et al., 2007; Polivy, & Herman, 2002), whereas other researchers have focused on the probable, yet elusive, genetic component (Leon, Keel, Klump, & Fulkerson, 1997; Spanos, Klump, Burt, McGue & Iacono, 2010).

The studies that have examined parental influence on EDs often focus on maternal criticisms and expressed emotion in the development and maintenance of EDs. Expressed emotion is often measured using behavioral observation methods, in which observers code how family members talk about a person without the person present. Although commonly measured using behavior observation, self-reports have also been developed to measure the five components of expressed emotion: critical comments, hostility, emotional overinvolvement, warmth, and positive remarks. Perceived criticism differs from expressed emotion in assessing criticism from a single perspective through self-report (Polivy & Herman, 2002). Although these perspectives were widely accepted and remain topics of research and treatment (Minuchin et al., 1979), meta-analyses have indicated that they are not consistently associated with EDs (Stice, 2002). Familial reinforcement of disordered eating and exercise behaviors have also been found to propagate the development of EDs as well as disordered exercise behaviors (Branch & Eurman, 1980; Field et al., 2001; Kenny & Hart, 1992). Much of the research conducted on parental influence on EDs has failed to determine the direction of causation within clinical populations, much less in high-risk populations (Polivy & Herman, 2002).

Much like family and parent factors, peer influence, cliques, peer comparison, and social acceptance have been significantly correlated with body image concerns, dietary restraint and disordered exercise with unknown direction of causation (Field et al., 2001; McVey et al., 2002; Paxton, Schutz, Wertheim & Muir, 1999). Additionally, peer pressure has been linked to the

development of bulimic behaviors and disordered eating in general (Levine, Smolak, Moodey & Hessen, 1994). A study by Wasilenko, Kilik and Wanic (2007) found an increase in body dissatisfaction, disordered eating, and exercise behaviors among women who frequently compared themselves to their peers. Despite the significant research examining both parent and peer influences on disordered eating and exercise behaviors, the majority of research looks at intact support systems of girls in early adolescence, but not during periods of separation from, or formation of, social networks.

Stress is another construct that has been studied as a potential risk factor for disordered eating. Stress can increase vulnerability to other risk factors as well as encourage the relapse of successfully treated EDs. Stress related eating is often referred to “emotional eating” and it is most strongly associated with the disordered bingeing behavior typically seen in BED (Kristeller & Hallett, 1999). In bingeing disorders, the consumption of food is believed to be a disordered stress response and develops into a coping mechanism. It is the impact of stress on eating behavior and its interaction with the reward systems that have been implicated in the obesity epidemic and increased prevalence of BED (Adam & Epel, 2007). It is also hypothesized that the restrictive and purging behaviors seen in adolescents with AN and BN is also a stress response (Strober, 1984), but the difference between AN and BN in the disordered stress responses has not been studied.

Present Research

The aim of the current research is to evaluate gender differences in and potential interactions among several established risk factors for disordered eating and exercise among college students in their first semester at college. First, we aimed to examine mean comparisons between women and men on levels of ED symptoms and risk factors for EDs, and we

hypothesized that compared to men, women would report higher levels of symptoms of disordered eating and exercise. Second, we hypothesized that higher levels of expressed emotion and perceived family criticism, poorer family functioning, greater peer comparison, and higher levels of perceived stress would be associated with higher levels of disordered eating and exercise behaviors. Third, we predicted that higher levels of disordered eating and exercise behaviors would be associated with three interactions between risk factors. Specifically, it was hypothesized that (a) the association between perceived stress and disordered eating and disordered exercise and would be stronger in magnitude with higher levels of family criticism, (b) the association between peer comparison and disordered eating and disordered exercise would be stronger in magnitude with higher levels of perceived criticism, and (c) the association between poorer family functioning and disordered eating and disordered exercise would be stronger in magnitude with higher levels of family criticism. Fourth, we aimed to compare parent and student scores on family functioning and expressed emotion in order to examine how well parent reports of family function and expressed emotion predicted student disordered eating and exercise behaviors.

Method

Participants

Participants for this study were 166 undergraduate students enrolled in the research pool associated with General Psychology (PSYC 1001) at the University of Colorado Boulder. Participants voluntarily partake in the research pool to receive research credit towards their final grade; other options are available to students to receive research credit besides participation in the pool. In order to determine eligibility to participate in the study, participants completed an initial screening that included items to determine eligibility criteria described below.

To be eligible for the study, students had to be in their first year of study at the University of Colorado Boulder, have a BMI > 18.5 at the time of the screening, and be fluent in English, and they could not be enrolled in a weight loss program. Students in their second year or higher of undergraduate study at the University of Colorado Boulder, pregnant women, and those with a history of any eating disorder were excluded from participation in the study.

Two participants completed the questionnaire but were excluded, the first for gender binary nonconformity (i.e., they chose an “other” category for gender), and the second after preliminary analyses identified the person as a univariate outlier on the measure of disordered eating behaviors. The final sample size consisted of 100 female participants and 66 male participants. Table 1 presents the demographics for the students who completed this study compared to the demographics of all students enrolled at the University of Colorado Boulder.

Measures

Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 2008). The EDE-Q is a frequently used measure of disordered eating behavior. It consists of 28 items [e.g., “Have you been deliberately trying to limit the amount of food you eat to influence your shape or weight (whether or not you have succeeded?”] that are rated on a 7-point scale. Scored responses to the items are averaged, with higher scores reflecting higher disordered eating behavior. The measure was shown to be internally consistent in this sample ($\alpha = .94$).

Obligatory Exercise Questionnaire (OEQ; Ogden, Veale & Summers, 1997). The OEQ is a measure of endorsement of exercise behaviors. It consists of 20 items (e.g., “When I miss an exercise session, I feel concerned about my body possibly getting out of shape”) that are rated on a 4-point scale with two items reverse scored. The scored items are averaged, with higher scores

indicating greater disordered exercise behaviors. The OEQ was shown to be internally consistent in this sample ($\alpha = .89$).

Family Emotional Involvement and Criticism Scale (FEICS; Shields, Franks, Harp, McDaniel & Campbell, 1992). The perceived criticism subscale of the FEICS is a measure of parental criticism and expressed emotion. The subscale consists of 6 items (e.g., “My family is always trying to get me to change”) scored on a 5-point scale, with two items reverse scored. Higher average scores indicate higher parental criticism and expressed emotion. The subscale was shown to be internally consistent in this sample ($\alpha = .83$).

Perceived Criticism Scale (PCS; White et al., 1998). The PCS consists of 4 items (e.g., “How critical is your family of you?”) that are used to measure perceived family, parent, and sibling criticism. The PCS is rated on a 10-point scale, with higher mean scores reflecting greater perception of criticism. The PCS was found to be internally consistent in this sample ($\alpha = .93$).

Family Assessment Device (FAD-G; Epstein, Baldwin & Bishop, 1983). The general functioning subscale of the Family Assessment Device measures family functioning consisting of 13 items (e.g., “We cannot talk to each other about the sadness we feel”), scored on a four-point scale. Seven items were reverse scored. The mean of the items was computed to assess family functioning, with lower scores indicating better functioning. This measure was shown to be internally consistent within this sample ($\alpha = .75$).

Revised Physical Appearance Comparison Scale (PACS-R; Schaefer & Thompson, 2014). The PACS-R measures physical comparison of the self to peers, composed of 11 items (e.g., “When I’m out in public, I compare my physical appearance to the appearance of others.”), scored on a 5-point scale. The average of the items was computed to measure physical

comparison to peers, with higher scores indicating greater comparison. The measure was found to be internally consistent in this sample ($\alpha = .97$).

Perceived Stress Scale (PSS; Cohen & Williamson, 1988). The PSS is widely used in the measure of stress. The PSS consists of 10 items (e.g., “In the last month, how often have you found that you could not cope with all the things that you had to do?”) scored on a 5-point scale, with four items reverse scored. The mean score of the items are used to measure perception of stress, with higher scores indicating higher perceived stress. The PSS was internally consistent in this sample ($\alpha = .89$).

Procedure

Student participants completed the online questionnaires at their convenience within a two-week time frame. Upon completion of the questionnaire, students received the research credit for their class, and were asked to provide consent for their parents to be contacted as part of the study. If the parents completed the corresponding parent questionnaire, consisting of the FEICS and FAD-G, their students became eligible to participate in a compensated follow-up portion of the study to assess change in eating and exercise behaviors over the course of the first year at university.

Results

Independent samples *t*-test were used to test for differences between women and men on the study questionnaires. These results, which are presented in Table 2, suggest that compared to males, females scored significantly higher on disordered eating behaviors, peer comparison on physical appearance, and perceived stress. The test for gender differences on perceived criticism approached but did not reach statistical significance, and there were no significant differences for

the other measures. These results provided partial support for the study hypothesis that compared to men, women would report higher levels of disordered eating and exercise.

The second hypothesis was that disordered eating and exercise behaviors would be significantly and positively correlated with perceived stress, peer comparison, and family criticism and significantly and negatively correlated with family functioning. Pearson correlations were computed among all the study variables; the results from these analyses are presented in Table 3. As can be seen in this table, disordered eating behaviors were significantly and positively correlated with exercise behaviors, peer comparison, and perceived stress. Disordered eating behaviors were not significantly correlated with expressed emotion, perceived criticism, or family functioning. Disordered exercise behaviors were significantly and positively correlated with disordered eating behaviors and peer comparison but were not significantly correlated with expressed emotion, perceived criticism, family functioning, or perceived stress. Among the other significant correlations were negative correlations between family criticism and family functioning, and between family functioning and perceived stress. Positive correlations were found between family criticism and perceived stress, and between perceived criticism and family criticism.

Three multiple regression analyses were used to test potential interaction effects between the risk factors and their association with disordered eating and exercise behaviors. In these interactions, either disordered eating or disordered exercise behavior were regressed on the interaction term and the associated component terms; variables were mean deviated (i.e., centered) prior to creating the interaction terms. Because there were gender differences in mean levels of disordered eating and several of the other study questionnaires, gender was entered as a covariate in these analyses. The interactions between family criticism and stress (Table 4), peer

comparison and perceived criticism (Table 5), and family functioning and family criticism (Table 6) were not significantly associated with disordered eating or exercise behaviors.

Of the 166 students sampled, permission was granted to contact 76 parents, of which 36 (47.6%) completed the questionnaire for 31 students. Due to the low response rate of parents, we were unable to analyze the parent data to determine student-parent differences in perception of family functioning. We were also unable to examine the association, if any, between parent perceptions of family functioning and the disordered eating and exercise behaviors of the student. Additionally, we were unable to examine the longitudinal association between risk factors and potential changes in disordered eating and exercise behaviors over the first year of study, because only three (9.6%) of the 31 students with parent data completed the follow-up questionnaire.

Discussion

The present study aimed to evaluate gender differences on, and the main and moderated association between, several risk factors for disordered eating and exercise behaviors in a sample of first year undergraduates as they transitioned into the university environment. Results indicated several significant gender differences on and correlations between risk factors and disordered eating and exercise.

As was hypothesized, there was a statistically significant gender difference in eating behaviors, and this difference was associated with a large effect size. This finding is consistent with the literature regarding higher rates of eating problems and diagnosable EDs among females (Delinsky & Wilson, 2008; Eisenberg, Nicklett, Roeder, & Kirz, 2011). Contrary to our hypothesis, no gender differences were detected in disordered exercise behaviors.

Additionally, disordered eating and disordered exercise were moderately correlated at a statistically significant level. This finding is consistent with the established findings indicating that compensatory behaviors such as excessive exercise may be established by the time students start university or begin to emerge in a new environment (Cooley & Toray, 2001). However, the relationship between disordered eating and exercise behaviors could also be a response to living independently for the first time or in attempts to counteract first year weight gain (Delinsky & Wilson 2008).

There were also several gender differences on risk factors for EDs. For example, there was a gender difference in peer comparison, and this difference was associated with a large effect size, suggesting that females compare their physical appearance to their peers more than do males. Peer comparison was also highly correlated with disordered eating behaviors. This correlation supports the proposed hypothesis by Vohs, Heatherton, and Herrin (2001) that the cognitive systems of disordered eating are already in place before the transition to university. Alternatively, the relationship between disordered eating behavior and peer comparison may result from attachment to and investment in homogenous peer groups while at university, a premise advanced by Paxton, Schultz, Wertheim, and Muir (1999).

The only additional variable for which there was a gender difference that was statistically significant was perceived stress: compared to men, women reported higher levels of perceived stress. In addition, perceived stress had a moderate positive correlation with disordered eating behaviors. This association may be due to disordered eating resulting in stress and strain on student life, or the association could suggest that stress precipitates disordered eating as has been seen with ED relapse (Fairburn & Harrison, 2003). Perceived stress was also moderately and negatively correlated with family functioning and positively correlated with family criticism.

This association may be the result of stress induced by the academic rigor of university-level education impacting or amplifying the separation from the student's established support systems, thus contributing to student and family relationships that are strained during the period of transition and adjustment. Alternatively, poor family functioning could contribute to students' stress, as families may criticize the students' performance or behaviors, increasing their level of stress.

None of the measures of family functioning (i.e., family functioning, expressed emotion, perceived criticism) were significantly associated with disordered eating or exercise, nor did any of the hypothesized interactions among risk factors account for unique variance in eating or exercise behaviors. Taken together, these results suggest that family functioning may have relatively little importance in explaining disordered eating and exercise behaviors in adolescents. As proposed by the meta-analysis conducted by Stice (2002), the current conceptualization of family functioning as a risk factor for disordered eating and exercise behaviors is more of a widely held belief, than a scientifically supported association.

Limitations

One limitation of this study is the reliance on self-report measures. Few of the measures used in this study utilized a specific time frame of reference, but others asked for participants to make more general comments about behaviors, family functioning, and environments. There is also a potential sampling bias within this study. As the participants are taking a course required of psychology majors, the results of this study may only be generalizable to first year psychology students.

Multiple cultural and environmental factors could have influenced the outcomes of this study. First, the inclusion of international students, while enhancing ecological validity, could

have impacted results because of cultural differences in eating, exercise, or family structure and functioning. Second, it is important to note that the cultural environment of Boulder, Colorado may impact the results of this study. Boulder is often praised as one of the healthiest cities in the United States with the lowest obesity rates (Gallup-Healthways Well-Being Index, 2014). Thus excessive exercise and engaging in dieting behaviors may not be considered to be disordered behaviors by participants in this community, who in turn may underreport frequency and severity of such behaviors.

Future Studies

Longitudinal data should be collected to determine the course of disordered behaviors during college and later in life when the onset of BED is most common. Additionally, research into university-specific settings is needed to examine the role of environment on the development and course of disordered eating and exercise behaviors so as to better target early identification and preventative measures.

Summary

The gender differences and correlations found in this study are largely consistent with the existing literature. However, the results also pose alternative explanations for the impact of expressed emotion and family criticism as a risk factor for disordered eating behaviors through lack of significant interactions and noticeably higher correlations between disordered eating behaviors and both perceived stress and peer comparison in subclinical populations. The importance of identifying risk factors prior to the escalation of disordered eating and exercise behaviors is the first step in reducing the incidence of EDs. In light of the present findings, special consideration should be paid to addressing peer comparison and the role of perceived

stress in addition to other identified risk factors, especially within the university setting, in order to make preventative measures more effective.

References

- Adam, T. C., & Tipler, E. S. (2007). Stress, eating and the reward system. *Physiology & Behavior* 91(4), 449-458. doi:10.1016/j.physbeh.2007.04.011
- American College Health Association (2015). American College Health Association-National College Health Assessment II: Reference Group Executive Summary Spring 2015, p. 3-9
- Baker, C. W., Whisman, M. A., & Brownell, K. D. (2000). Studying intergenerational transmission of eating attitudes and behaviors: methodological and conceptual questions. *Health Psychology* 19(4), 376-381. doi:10.1037/0278-6133.19.4.376
- Branch, C. H., & Eurman, L. J. (1980). Social attitudes towards patients with anorexia nervosa. *American Journal of Psychiatry*, 137(5), 631-2. doi:10.1176/ajp.137.5.631
- Center for Collegiate Mental Health (2016, January). *2015 Annual Report*. (Publication No. STA 15-108). Retrieved from http://www.psu.edu/ccmh/wp-content/uploads/sites/3058/2016/01/2015_CCMH_Report_1-18-2015.pdf
- Cooley, E., & Toray, T. (2001). Disordered eating in college freshman women: A prospective study. *Journal of American College Health*, 49(5), 229-235. doi:10.1080/07448480109596308
- Delinsky, S. S. & Wilson, G. T. (2008). Weight gain, dietary restraint, and disordered eating in the freshman year of college. *Eating Behaviors* 9(1), 82-90. doi:10.1016/j.eatbeh.2007.06.001
- Eisenberg, D., Nicklett, E. J., Roeder, K., & Kirz, N. E. (2011). Eating disorder symptoms among college students: Prevalence, persistence, correlates, and treatment-seeking. *Journal of American College Health*, 59(8), 700-707. doi:10.1080/07448481.2010.546461

Fairburn, C. G., & Harrison, P. J. (2003). Eating disorders. *The Lancet*, 361(9355), 407-416.

doi:10.1016/S0140-6736(03)12378-1

Field, A. M., Camargo, C. A., Taylor, C. B., Berkey, C. S., Roberts, S. B., & Colditz, G. A.

(2001). Peer, parent, and media influences on the development of weight concerns and frequent dieting among preadolescent and adolescent girls and boys. *Pediatrics*, 107(1), 54-60. doi:10.1542/peds.107.154

Freeman, L. M. Y., & Gil, K. M. (2004). Daily stress, coping, and dietary restraint in binge eating. *International Journal of Eating Disorders*, 36(2), 204-212. doi:10.1002/eat.20012

Gallup-Healthways Well-Being Index (2014). Boulder, Colo., residents still least likely to be obese. (2014, April 4). Retrieved November 7, 2015, from

<http://www.gallup.com/poll/168230/boulder-colo-residents-least-likely-obese.aspx>

Hoek, H. W., & van Hoken, D. (2003). Review of the prevalence and incidence of eating disorders. *The International Journal of Eating Disorders*, 34(4), 383-396.

doi:10.1002/eat.10222

Hudson, J. I., Hiripi, E., Pope, H. G., & Kessler, R. C. (2007). The prevalence and correlates of eating disorders in the national comorbidity survey replication. *Biological Psychiatry*, 61(3), 348-358. doi:10.1016/j.biopsych.2006.03.040

Hunt, J., & Eisenberg, D. (2010). Mental health problems and help-seeking behavior among college students. *The Journal of Adolescent Health : Official Publication of the Society for Adolescent Medicine*, 46(1), 3-10. doi:10.1016/j.jadohealth.2009.08.008

Hsu, L. K., Kaye, W., & Weltzin, T. (1993). Are the eating disorders related to obsessive compulsive disorder?. *International Journal of Eating Disorders* 14(3), 305-318. doi:10.1992/1098-108X(199311)14:3<305::AID-EAT2260140309>3.0.CO;2-L

- Kenny, M. E., & Hart, K. (1992). Relationship between parental attachment and eating disorders in an inpatient and college sample. *Journal of Counseling Psychology, 39*(4), 521-526.
doi:10.1037/0022-1067.39.4.521
- Kristeller, J. L., & Hallet, C. B. (1999). An exploratory study of meditation-based intervention for binge eating disorder. *Journal of Health Psychology, 4*(3), 357-363.
doi:10.1177/135910539900400305
- Leon, G. R., Keel, P. K., Klump, K. L., & Fulkerson, J. A. (1997). The future of risk factor research in understanding the etiology of eating disorders. *Psychopharmacology Bulletin, 33*(3), 405-41. Retrieved from <http://0-search.proquest.com/libraries.colorado.edu/docview/212439940?accountid=14503>
- Levine, M. P., Smolak, L., Moodey, A. F., Shuman, M. D., & Hessen, L. D. (1994). Normative developmental challenges and dieting and eating disturbances in middle school girls. *International Journal of Eating Disorders 15*(1), 11-20. doi:10.1002/1098-108X(199401)15:1<11::AID-EAT2260150103>3.0.CO;2-Q
- McVey, G. L., Pepler, D., Davis, R., Flett, G. L., & Abdoell, M. (2002). Risk and protective factors associated with disordered eating during early adolescence. *The Journal of Early Adolescence, 22*(1), 75-95. doi:10.1177/0272431602022001004
- Minuchin, S., Rosman, B. L., & Baker, L. (1979). Psychosomatic families: Anorexia nervosa in context. *International Journal of Group Psychotherapy, 29*(2), 271-3.
doi:10.1080/00207284.1979.11491995
- Paxton, S. J., Schultz, H. K., Wertheim, E. H., & Muir, S. L. (1999). Friendship clique and peer influences on body image concerns, dietary restraint, extreme weight-loss behaviors, and

- binge eating in adolescent girls. *Journal of Abnormal Psychology*, 108(2), 255-266.
doi:10.1037/0021-843X.108.2.255
- Polivy, J., & Herman, C. P. (2002). Causes of eating disorders. *Annual Review of Psychology*, 53(1), 187-213. doi:10.1146/annurev.psych.53.100901.135103
- Schreyer, C. C., Coughlin, J. W., Makhzoumi, S. H., Redgrave, G. W., Hansen, J. L., & Guarda, A. S. (2015). Perceived coercion in inpatients with anorexia nervosa: Associations with illness severity and hospital course. *International Journal of Eating Disorders*, 48(7), 1-6.
doi:10.1002/eat.22476
- Smink, F. R. E., van Hoeken, D., & Hoek, H. W. (2013) Epidemiology, course, and outcome of eating disorders. *Current Opinion in Psychiatry*, 26(6), 543-548.
doi:10.1097/YCO.0b013e328365a24f
- Smolak, L., Murnen, S. K., & Ruble, A. E. (2000). Female athletes and eating problems: a meta-analysis. *International Journal of Eating Disorders*, 27(4), 371-380.
doi:10.1002/(SICI)1098-108X(200005)27:4<371::AID=EAT1>3.0.CO;2-Y
- Spanos, A., Klump, K. L., Burt, S. A., McGue, M., & Iacono, W. G. (2010). A longitudinal investigation of the relationship between disordered eating attitudes and behaviors and parent-child conflict: A monozygotic twin differences design. *Journal of Abnormal Psychology*, 119(2), 293-299. doi:10.1037/a0019028
- Stice, E. (2002). Risk maintenance factors for eating pathology: A meta-analytic review. *Psychological Bulletin*, 128(5), 825-848. doi:10.1037/0033-2909.128.5.825.
- Streigel-Moore, R. H., & Bulik, C. M. (2007). Risk factors for eating disorders. *American Psychologist*, 62(3), 181-198. doi:10.1037/0003-066X.62.3.181

- Strober, M. (1984). Stressful life events associated with bulimia in anorexia nervosa. Empirical findings and theoretical speculations. *The International Journal of Eating Disorders* 3(2), 3-16. doi:10.1002/1098-108X(198424)3:2
- Sulkowski, M. L., Dempsey, J., & Dempsey, A. G. (2011). Effects of stress and coping on binge eating in female college students. *Eating Behaviors* 12(3), 188-191. doi:10.1016/j.eatbeh.2011.04.006
- Sundgot-Borgen, J., & Torstveit, M. K., (2004). Prevalence of eating disorders in elite athletes is higher than in the general population. *Clinical Journal of Sport Medicine*, 14(1), 25-32. doi:10.1097/00042752-200401000-00005
- Taranis, L., & Meyer, C. (2010). Perfectionism and compulsive exercise among female exercisers: High personal standards or self-criticism? *Personality and Individual Differences* 49(1), 3-7. doi:10.1016/j.paid.2010.02.024
- Vohs, K. D., Heatherton, T. F., & Herrin, M. (2001). Disordered eating and the transition to college: A prospective study. *The International Journal of Eating Disorders*, 29(3), 280-288. doi:10.1002/eat.1019
- Wasilenko, K. A., Kilik, J. A., & Wanic, R. A. (2007). Effects of social comparisons with peers on women's body satisfaction and exercise behavior. *International Journal of Eating Disorders* 40(8), 740-745. doi:10.1002/eat.20433
- White, S., Reynolds-Malear, J. B., & Cordero, E. (2011). Disordered eating and the use of unhealthy weight control methods in college students: 1995, 2002, 2008. *Eating Disorders: The Journal of Treatment and Prevention*, 19(4), 323-334. doi:10.1080/10640266.2011.584805

- Woodside, D. B., Garfinkel, P. E., Lin, E., Goering, P., Kaplan, A. S., Goldbloom, D. S., & Kennedy, S. H. (2001). Comparisons of men with full or partial eating disorders, men without eating disorders, and women with eating disorders in the community. *American Journal of Psychiatry* 158(4), 570-574. doi:10.1176/appi.ajp.158.4.570
- Yager, Z., & O'Dea, J. (2010). A controlled intervention to promote a healthy body image, reduce eating disorder risk and prevent excessive exercise among trainee health education and physical education teachers. *Health and Education Research* 25(5), 841-852. doi:10.1093/her/cyq03
- Zhao, Y., & Encinosa, W. (2009). Hospitalizations for eating disorders from 1999-2006. *HCUP statistical brief #70*. Rockville, MD: Agency for Healthcare, Research, and Quality. Retrieved from <http://www.hcup-us.ahrq.gov/reports/statbriefs/sb70.pdf>

Table 1

Sample Descriptives and Demographic Comparisons with University of Colorado Boulder

Variable	Descriptive Statistics (n)	University of Colorado Boulder
Female	60.25% (100)	44%
Male	39.75% (66)	56%
Age in years (Female)	18.11	
Age in years (Male)	18.38	
BMI (Female)	22.06	
BMI (Male)	24.77	
White	71.86% (120)	68.9%
Black/African American	1.20% (2)	2.2%
Asian	8.38%(14)	7%
Native American	0%	1.4%
Pacific Islander/Hawaiian	0%	0.4%
Hispanic/Latino	4.79% (8)	6.8%
More than one ethnicity	11.38% (19)	3.5%
Other	2.40% (4)	9.8%

Table 2

Gender Differences on Study Questionnaires

Variable	Females		Males		<i>t</i>	<i>d</i>
	Mean	<i>SD</i>	Mean	<i>SD</i>		
Eating Behaviors	1.90	1.29	0.75	0.72	-7.31***	-1.10
Exercise Behaviors	2.17	0.45	2.17	0.54	-.10	0.00
Family Functioning	2.92	0.43	2.88	0.28	-.65	-0.11
Perceived Stress	1.79	0.63	1.53	0.58	-2.64***	-0.43
Family Criticism	1.68	0.72	1.82	0.67	1.21	0.20
Peer Comparison	2.13	1.12	1.34	0.97	-4.62***	-0.75
Perceived Criticism	5.29	3.10	6.21	2.82	1.95	0.31

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 3

Pearson Correlations Among Study Questionnaires

Variables	2	3	4	5	6	7
1 Eating Behaviors	.219**	-.142	.359***	.149	.746***	-.052
2 Exercise Behaviors		.067	-.061	-.003	.220**	-.069
3 Family Functioning			-.380**	-.577**	-.094	-.251**
4 Perceived Stress				.388***	.280***	.132
5 Family Criticism					.048	.312***
6 Peer Comparison						-.055
7 Perceived Criticism						

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 4

Interaction of Family Criticism and Perceived Stress on Eating and Exercise Behaviors

Outcome	Variable	<i>b</i>	β
Eating	Gender	1.01**	.40
	Perceived Stress	.55**	.28
	Family Criticism	.07	.04
	Perceived Stress \times Family Criticism	.15	.05
Exercise	Gender	-.00	-.00
	Perceived Stress	-.02	-.02
	Family Criticism	-.04	-.06
	Perceived Stress \times Family Criticism	.19	.16

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 5

Interaction of Peer Comparison and Perceived Criticism on Eating and Exercise Behaviors

Outcome	Variable	<i>b</i>	β
Eating	Gender	.58**	.23
	Peer Comparison	.73**	.66
	Perceived Criticism	.01	.03
	Peer Comparison \times Perceived Criticism	.01	.04
Exercise	Gender	-.09	-.09
	Peer Comparison	.10**	.24
	Perceived Criticism	-.01	-.06
	Peer Comparison \times Perceived Criticism	.01	.09

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 6

Interaction of Family Functioning and Family Criticism on Eating and Exercise Behaviors

Outcome	Variable	<i>b</i>	β
Eating	Gender	1.22	.50
	Family Functioning	-.21	-.07
	Family Criticism	.37	.22
	Family Functioning \times Family Criticism	.48	.12
Exercise	Gender	-.02	-.02
	Family Functioning	.11	.08
	Family Criticism	-.02	-.03
	Family Functioning \times Family Criticism	-.23	-.14

* $p < .05$. ** $p < .01$. *** $p < .001$.